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RESEARCH AND DEVELOPMENT OBJECTIVES

IMAGERY EXPLOITATION MODULE CONCEPT STUDY

1. INTRODUCTION. Organizations involved in the exploitation of reconnaissance imagery are confronted with the issue of maximizing the efficiency of the human interpreter in his primary task of extracting and reporting timely and complete information from the various types of imagery and data available to him.

This is an increasingly complex problem because of several dynamic factors: (1) a steady growth in the volume of imagery which interpreters must utilize; (2) better quality of imagery containing an increasing amount of detail which can be extracted; (3) use of unconventional types of imagery such as infrared, color, and radar; and (4) the increasing variety of types and the expanding detail of requirements for information to be extracted from imagery. In addition, a major factor which contributes to this problem is the limitation on the available numbers of fully qualified interpreters. It is therefore necessary to increase the efficiency of the interpreters by designing, organizing, and utilizing interpretation equipment, support functions, procedures, etc., in the most productive mode.

2. CONCEPT.

2.1. Purpose. It is envisioned that future interpretation activities will be performed in an "encapsulated" environment which will permit the interpreters to work at full efficiency. This implies a highly automated module in which all support functions are available to the interpreter in a highly expeditious mode. For example, the physical handling of film would be minimized, or ideally, eliminated. Likewise, the physical handling and manipulation of collateral data such as maps would be minimized, yet allowing him full use of the information. In addition, the interpreter must have immediate access to accurate measurements of objects he is interpreting.

It is probable that one type of module would not be ideal for all types of interpretation jobs. Eventually, it may be necessary to have rapid mission scanning modules, detailed analysis modules, multi-sensor modules, transmitted imagery modules, etc. This factor should be determined as part of the study.

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GROUP 1
Excluded from automatic downgrading and declassification

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This study should not be inhibited by current restrictions on space and facilities. It should consider existing and planned interpretation equipment but should not be limited to them. If existing or planned equipment does not perform the required tasks as determined by the study, conceptual designs of new equipment should be submitted.

To ensure future compatibility to the overall system, it is imperative that there be very close coordination of this project with the various other R&D programs in progress. For example, planned storage and retrieval systems, human factors research, automatic target recognition research, unconventional imagery systems, and the many equipment development projects currently underway or being planned.

2.2. Scope. The overall project has been divided into two phases; however, it has not been determined, as of this date, if both phases will be funded on the initial contract.

2.2.1. Phase I. The initial effort will consist of the following:

(a) an analysis of current interpretation facilities, procedures, and equipment;

(b) an analysis of the volume and characteristics of future input materials and the expected intelligence requirements to be levied on the interpreter.

(c) conceptual designs of module or modules which will satisfy future interpretation requirements as determined in (b) above.

(d) determine the equipment requirements for these modules and make appropriate recommendations.

2.2.2. Phase II.

(a) Fabrication of a breadboard experimental module mock-up based on Phase I results.

(b) Conduct a program of experiments in the mock-up module. These experiments would verify and refine theoretical concepts as established in Phase I.

(c) Produce detailed final designs of operational interpretation modules.

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3. REQUIREMENTS. To ensure a complete study of module requirements and design, the following factors which affect the interpretation process should be considered:

3.1. The Physical Environment. It will be necessary to evaluate such environmental factors as the maximum allowable noise level, the type, intensity, and manipulation of ambient lighting, the optimum space requirements, what type of furniture is required, what are the cleanliness requirements, etc.

3.2. Film Handling. It will be necessary to determine the optimum degree of automation in the physical access to the film to be exploited, the methods of placing the film for display, film manipulation, and disposal of film when the interpreter no longer needs it. Roll film and film chips are to be considered. It should be noted that multiple rolls and/or miltiple chips may have to be handled simultaneously.

3.3. Image Displays. Analyses should be made of display modes, screen sizes, screen positions, multiple displays, image magnification, image enhancement and manipulation, multi-sensor displays and detailed (microscopic) displays.

3.4. Collateral Information. Considerable attention should be focused on the access and display modes of the various types of collateral data used by the interpreter. These include other rolls and/or chips of film, mission coverage plots, various types of maps, and various types of printed material.

3.5. Image Measurement. The key factor to consider here is that, quite frequently, the interpreter requires very accurate dimensional and distance measurements to aid him in the interpretation process, and he needs them quickly. Therefore, attention should be given to the mode of acquiring these measurements.

3.6. Reporting Methods. The study should allow for the compatibility of current reporting methods with the projected designs for various modules, and recommendations should be made for alternate procedures.

3.7. Reproduction. The study and designs should consider methods and equipment requirements for rapid reproduction of image chips, enlargements, paper prints, etc. within certain modules.

3.8. Transmitted Imagery. An analysis should be made of the potential problems associated with imagery received through a data-link system; solutions to these problems should be recommended. This would include signal processing, image viewing, image enhancement, and image manipulation.

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3.9. Multi-sensor Imagery. The study should include analysis of equipment requirements and methods of handling, viewing, manipulation, and comparing imagery from multi-sensor collection systems.

3.10. Module Communications. Module designs should include all aspects of internal and external communications. Included should be audio systems, remote display of imagery, real-time reporting requirements, etc.

3.11. Housekeeping and Administration. Considerable attention should be given to the reduction or elimination of non-interpretation chores within the modules. Procedures should be recommended which minimize such interruptions to the basic interpretation tasks. These include equipment maintenance, administrative paperwork, acquisition of supplies, etc.

3.12. Security Control. Module designs should include equipment and procedures which will ensure that the appropriate security safeguards are not violated. Factors to be considered are image chip reproductions, inadvertent external propagation of electronic signals and other data, control of documents, control of visitors, etc.

4. END PRODUCTS. The primary product desired from this study is a set of conceptual designs which recommend the optimum layout and content of, and procedures for use in, self-contained modules designed for the various types of imagery interpretation. Each module design should be described in such detail that it clearly depicts the philosophy of the design, the interfaces involved, and any problems inherent in its implementation.

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